## PARASITES OF POTATO-INFESTING APHIDS AND OF SOME OTHER APHIDS IN MAINE

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Field collections of parasitized aphids were made between 1942 and 1950 in connection with research on the biology and control of potato-infesting aphids in Maine. Most of the collections were from northeastern Maine near Presque Isle in east-central Aroostook county, although some were from the central part of the State. The number of collections varied from year to year.

Most of the collections were from secondary host plants but some were from primary hosts. Host plants included potatoes (*Solanum tuberosum* L.), wild rutabaga (*Brassica campestris* L.), wild radish (*Raphanus raphanistrum* L.), hemp nettle (*Galeopsis tetrahit* L.), lamb's-quarters (*Chenopodium album* L.), smartweed (*Polygonum lapathifolium* L.), field sorrel (*Rumex acetosella* L.), oxeye-daisy *Chrysanthemum leucanthemum* var. *pinnatifidum* Lecoq and Lamotte), English peas (*Pisum sativum* L.), alder-leaved buckthorn (*Rhamnus alnifolia* L'Hèr.), Canada plum (*Prunus nigra* Ait.), swamp rose (*Rosa palustris* Marsh.), and rugose rose (*R. rugosa* Thunb.).

The parasitized aphids were placed in vials and held at room temperature until adult parasites emerged. Then the parasites were preserved with the aphids from which they emerged, by filling the vials with 30-percent alcohol.

Parasites were reared from the following aphids during this period:

Buckthorn aphid ..... *Aphis abbreviata* Patch
English grain aphid ..... *Macrosiphum granarium* (Kby.)
Foxglove aphid ..... *Myzus solani* (Klth.)= *convolvuli* (Klth.)= *pseudosolani* (Theob.).
Green peach aphid ..... *Myzus persicae* (Sulz.)
Pea aphid ..... *Macrosiphum pisi* (Harris)
Potato aphid ..... *Macrosiphum solanifolii* (Ashm.)
Turnip aphid ..... *Rhopalosiphum pseudobrassicae* (Davis)
*Hyalopterus atriplicis* L.
*Capitophorus* spp., believed to be mostly *potentillae* (Wlkr.) *tetrarhodus* (Wlkr.), and *poae* (Gill.).

Table 1 shows the total number of each species of parasite reared from each species of aphid, grouped according to primary and hyperparasites. According to Smith (1944), Clausen (1940), and others, all species of Aphidiinae are primary parasites. The hyperparasites have been so designated by Haviland (1920, 1921, 1922), Spencer (1926), Ferrière and Voukassovitch (1928), Griswold (1929), Dunn (1949),

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and others. On the other hand, Folsom and Bondy (1930) stated that *Pachyneuron siphonophorae* is an important primary parasite of *Aphis gossypii* Glov., and Ullyett (1938) reported that *Charips* sp. occasionally is a primary parasite.

Table 1. Numbers of parasites reared from aphids at Presque Isle, Maine, 1942-50.[1]

| Species of Parasite | Buckthorn aphid | Green peach aphid | Potato aphid | Foxglove aphid | *Capitophorus* spp. | Pea aphid | English grain aphid | *Hyalopterus atriplicis* | Turnip aphid |
|---|---|---|---|---|---|---|---|---|---|
| **Primary parasites** | | | | | | | | | |
| BRACONIDAE | | | | | | | | | |
| Aphidiinae | --- | 1 | --- | --- | --- | --- | --- | --- | --- |
| *Praon* sp. | --- | 5 | 13 | 2 | 2 | --- | 1 | --- | --- |
| *Praon aguti* Sm. | --- | **2** | 3 | **1** | --- | --- | --- | --- | --- |
| *Praon americanus* (Ashm.) | --- | **1** | --- | --- | --- | --- | --- | --- | --- |
| *Praon simulans* (Prov.) | --- | 5 | 7 | --- | --- | 28 | --- | --- | --- |
| *Aphidius* spp. | 3 | 9 | 62 | 1 | 5 | --- | **1** | --- | 2 |
| *Aphidius avenaphis* (Fitch) | --- | 8 | **3** | --- | **8** | --- | --- | --- | --- |
| *Aphidius nigripes* Ashm. | **3** | **17** | 170 | --- | **1** | --- | --- | --- | --- |
| *Aphidius nigriteleus* Sm. | **1** | 14 | **8** | **2** | **62** | --- | --- | --- | --- |
| *Aphidius ohioensis* Sm. | --- | --- | **8** | --- | --- | --- | --- | --- | --- |
| *Aphidius phorodontis* Ashm. | --- | 5 | --- | --- | --- | --- | --- | --- | --- |
| *Aphidius pisivorus* Sm. | --- | **2** | **35** | --- | --- | --- | --- | --- | --- |
| *Aphidius rosae* Hal. | --- | **4** | 153 | --- | --- | --- | --- | --- | --- |
| *A. (Lysiphlebus) testaceipes* (Cress.) | 32 | --- | --- | --- | --- | --- | --- | --- | --- |
| *Diaeretus rapae* (M'Int.) | **7** | 309 | 2 | --- | **1** | --- | --- | **5** | 20 |
| *Trioxys* sp. | **1** | --- | --- | --- | --- | --- | --- | --- | --- |
| **Hyperparasites** | | | | | | | | | |
| PTEROMALIDAE | | | | | | | | | |
| Sphegigasterinae | | | | | | | | | |
| *Asaphes fletcheri* (Cwfd.) | --- | 10 | **23** | **2** | **1** | **1** | --- | --- | **1** |
| *Asaphes rufipes* Brues | --- | --- | **5** | --- | --- | --- | --- | --- | --- |
| Pachyneurini | | | | | | | | | |
| *Coruna clavata* Wlkr. | --- | --- | **11** | --- | **2** | --- | --- | --- | --- |
| *Pachyneuron* sp. | --- | --- | **1** | --- | --- | --- | --- | --- | --- |
| *Pachyneuron siphonophorae* (Ashm.) | --- | --- | 1 | --- | --- | --- | --- | --- | --- |
| CYNIPIDAE | | | | | | | | | |
| Charipinae | | | | | | | | | |
| *Charips* sp. | --- | **10** | **1** | --- | **1** | --- | --- | --- | **1** |
| *Charips brassicae* (Ashm.) | --- | **6** | **6** | --- | **10** | --- | --- | --- | 1 |
| *Alloxysta* sp. | --- | --- | --- | --- | **1** | --- | --- | --- | **2** |
| CERAPHRONIDAE | | | | | | | | | |
| *Lygocerus* sp., probably *niger* How. | **2** | **8** | 35 | --- | **8** | --- | --- | --- | --- |

[1]Bold face numerals indicate what appear to be new parasitization records prior to 1950.

The parasitizations observed in these studies were compared with those for the United States and Canada as published by MacGillivray and Spicer (1953), Muesebeck *et al.* (1951), Thompson (1944), Spencer (1926), Wheeler (1923), Smith (1919), Hauser *et al.* (1917), and Melander and Yothers (1915, 1916). In Table 1 bold face type is used to indicate what appear to be new parasitization records prior to 1950. These new records may be less accurate for the hyperparasites than for the primary parasites, since the literature frequently records the primary parasite as the host rather than the aphid from which the hyperparasite emerged. No effort in our study was made to determine the identity of the parasite from which the hyperparasite emerged. There are 4 new records for primary parasites of the potato aphid, 5 for the green peach aphid, 3 for the buckthorn aphid, 4 for *Capitophorus* spp., 2 for the foxglove aphid, and 1 for *Hyalopterus atriplicis*. Of the records for hyperparasites all are new except *Asaphes fletcheri*[1] for the green peach aphid, *Pachyneuron siphonophorae* for the potato aphid, and *Charips brassicae* for the turnip aphid.

At least 13 species of primary parasites and 9 species of hyperparasites were reared. Among the primaries at least 10 species were reared from the green peach aphid, 9 from the potato aphid, 6 from the buckthorn aphid, 5 from *Capitophorus* spp., 3 from the foxglove aphid, 2 from the English grain aphid and the turnip aphid, and 1 from the pea aphid and *Hyalopterus atriplicis*. Among the hyperparasites at least 7 species were reared from the potato aphid, 6 from *Capitophorus* spp., 4 from the green peach aphid, 4 from the turnip aphid, and one each from the buckthorn, foxglove, and pea aphids. None were reared from the English grain aphid or *Hyalopterus atriplicis*.

Some of the parasites showed a considerable specificity for certain species of aphids, although specificity by the hyperparasites probably was for the primary parasite rather than for the aphid. Among the primary *Aphidius* parasites, (*Lysiphlebus*) *testaceipes* and *Trioxys* sp. were reared only from the buckthorn aphid, *Aphidius phorodontis* only from the green peach aphid, and *Aphidius ohioensis* only from the potato aphid. *Diaeretus rapae* was reared almost entirely from the green peach aphid with only 2 specimens from the potato aphid, whereas *Aphidius rosae* was confined largely to the potato aphid. Among the hyperparasites, *Pachyneuron siphonophorae* and *Asaphes rufipes* were confined to the potato aphid, *Alloxysta* sp. to the turnip aphid and *Capitophorus* spp., and *Coruna clavata* to the potato aphid and *Capitophorus* spp.

The data in Table 2 indicate that the potato and green peach aphids were more commonly parasitized than were the buckthorn and foxglove aphids. Field observations corroborated this indication.

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[1] *Asaphes americanus* Gir. is a synonym.

It appears that the relative abundance of the various species of parasites differed from year to year, but this may have been due partly to differences in aphid abundance and the numbers collected. *Praon americanus*, *Aphidius phorodontis*, *Trioxys* sp., *Pachyneuron siphonophorae*, and *Alloxysta* sp. were represented in only 1 year; *Aphidius* (*Lysiphlebus*) *testaceipes*, *A. ohioensis*, and *A. avenaphis* 2 years each; *Praon aguti* 3 years; *Asaphes rufipes* 4 years; *Coruna clavata* 5 years; and *Aphidius nigriteleus*, *Aphidius pisivorus* and *Asaphes fletcheri* 6 years each; *Praon simulans*, *Aphidius nigripes*, and *A. rosae* 7 years each; *Charips brassicae* 8 years; and *Diaeretus rapae* and *Lygocerus* sp. 9 years each.

Table 2. Total numbers of parasites reared from each species of aphid at Presque Isle, Maine 1942-50.

| Species of aphid | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *Primary parasites* | | | | | |
| *Aphis abbreviata* | 0 | 6 | 2 | 0 | 1 | 2 | 2 | 31 | 3 | 47 |
| *Myzus persicae* | 4 | 3 | 204 | 40 | 86 | 19 | 9 | 5 | 12 | 382 |
| *Macrosiphum solanifolii* | 18 | 34 | 35 | 84 | 38 | 137 | 76 | 7 | 35 | 464 |
| *Myzus solani* | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 6 |
| *Capitophorus* spp. | 0 | 1 | 1 | 47 | 5 | 17 | 6 | 2 | 0 | 79 |
| *Macrosiphum granarium* | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 |
| *Macrosiphum pisi* | 0 | 4 | 22 | 0 | 0 | 0 | 0 | 1 | 1 | 28 |
| *Hyalopterus atriplicis* | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 5 |
| *Rhopalosiphum pseudobrassicae* | 0 | 2 | 3 | 0 | 1 | 11 | 5 | 0 | 0 | 22 |
| Total | 22 | 50 | 269 | 173 | 131 | 191 | 100 | 46 | 53 | 1035 |
| | | | | | *Hyperparasites* | | | | | |
| *Aphis abbreviata* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| *Myzus persicae* | 8 | 1 | 13 | 1 | 5 | 0 | 1 | 0 | 5 | 34 |
| *Macrosiphum solanifolii* | 11 | 15 | 6 | 2 | 7 | 22 | 9 | 4 | 7 | 83 |
| *Myzus solani* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |
| *Capitophorus* spp. | 0 | 2 | 1 | 2 | 4 | 12 | 2 | 0 | 0 | 23 |
| *Macrosiphum granarium* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Macrosiphum pisi* | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| *Hyalopterus atriplicis* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Rhopalosiphum pseudobrassicae* | 0 | 1 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 5 |
| Total | 19 | 20 | 21 | 5 | 17 | 36 | 13 | 4 | 15 | 150 |

Parasites reared in greatest numbers were those found every year. In general the total number of individuals of a species was proportional to the number of years it was represented. There was a large year-to-year variation in the percentage of parasitized aphids infested with hyperparasites.

B. D. Burks, A. B. Gahan, and L. H. Weld, of the former Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, identified the specimens of Pteromalidae and Cynipidae. Many assistants were employed seasonally by the Maine Agricultural Experiment Station for collecting the parasitized aphids.

Table 3. Total number of each species of parasite reared from aphids at Presque Isle, Maine 1942-1950.

| Parasite | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| *Primary parasites* | | | | | | | | | | |
| BRACONIDAE | | | | | | | | | | |
| Aphidiinae | .... | 1 | .... | .... | .... | .... | .... | .... | .... | 1 |
| *Praon* sp. | .... | 3 | 1 | 1 | 4 | 2 | 6 | 2 | 4 | 23 |
| *Praon aguti* Sm. | .... | .... | .... | 4 | 1 | .... | .... | 1 | .... | 6 |
| *Praon americanus* (Ashm.) | .... | .... | .... | .... | .... | 1 | .... | .... | .... | 1 |
| *Praon simulans* (Prov.) | 1 | 9 | 22 | 2 | .... | 4 | .... | 1 | 1 | 40 |
| *Aphidius* spp. | 18 | 30 | 6 | 7 | 7 | 7 | 2 | 3 | 3 | 83 |
| *Aphidius avenaphis* (Fitch) | .... | .... | .... | 16 | .... | .... | 3 | .... | .... | 19 |
| *Aphidius nigripes* Ashm. | .... | .... | 9 | 23 | 18 | 70 | 37 | 2 | 32 | 191 |
| *Aphidius nigriteleus* Sm. | .... | .... | 18 | 38 | 7 | 17 | 6 | 1 | .... | 87 |
| *Aphidius ohioensis* Sm. | .... | .... | .... | .... | .... | 5 | 3 | .... | .... | 8 |
| *Aphidius phorodontis* Ashm. | .... | .... | 5 | .... | .... | .... | .... | .... | .... | 5 |
| *Aphidius pisivorus* Sm. | .... | .... | 7 | 15 | 1 | 4 | 7 | .... | 3 | 37 |
| *Aphidius rosae* Hal. | .... | .... | 12 | 42 | 19 | 52 | 24 | 3 | 5 | 157 |
| *A. (Lysiphlebus) testaceipes* (Cress.) | .... | .... | .... | .... | .... | 1 | .... | 31 | .... | 32 |
| *Diaeretus rapae* (M'Int.) | 3 | 7 | 189 | 25 | 75 | 27 | 12 | 2 | 4 | 344 |
| *Trioxys* sp. | .... | .... | .... | .... | .... | .... | .... | .... | 1 | 1 |
| Total | 22 | 50 | 269 | 173 | 132 | 190 | 100 | 46 | 53 | 1035 |
| *Hyperparasites* | | | | | | | | | | |
| PTEROMALIDAE | | | | | | | | | | |
| Sphegigasterinae | | | | | | | | | | |
| *Asaphes fletcheri* (Cwfd.) | 10 | 9 | .... | .... | 4 | 7 | 4 | .... | 4 | 38 |
| *Asaphes rufipes Brues* | .... | .... | .... | .... | 1 | 2 | 1 | .... | 1 | 5 |
| Pachyneurini | | | | | | | | | | |
| *Coruna clavata Wlkr.* | .... | .... | 2 | .... | .... | 7 | 1 | 2 | 1 | 13 |
| *Pachyneuron* sp. | .... | .... | .... | .... | .... | .... | .... | 1 | .... | 1 |
| *Pachyneuron siphonophorae* (Ashm.) | .... | .... | .... | .... | .... | 1 | .... | .... | .... | 1 |
| CYNIPIDAE | | | | | | | | | | |
| Charipinae | | | | | | | | | | |
| *Charips* sp. | .... | .... | 8 | 1 | 3 | 1 | .... | .... | .... | 13 |
| *Charips brassicae* (Ashm.) | 3 | 2 | 1 | 1 | 1 | 11 | 3 | .... | 1 | 23 |
| *Alloxysta* sp. | .... | .... | .... | .... | .... | 3 | .... | .... | .... | 3 |
| CERAPHRONIDAE | | | | | | | | | | |
| *Lygocerus* sp. | 6 | 9 | 10 | 3 | 8 | 4 | 4 | 1 | 8 | 53 |
| Total | 19 | 20 | 21 | 5 | 17 | 36 | 13 | 4 | 15 | 150 |
| Percent of parasitized aphids from which hyperparasites were reared | 46.3 | 28.6 | 7.2 | 2.8 | 11.4 | 15.9 | 11.5 | 8.0 | 22.1 | 13.0 |

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